A literature review of recommender systems in the television domain

Abstract

Recommender Systems (RSs) are software tools and techniques providing suggestions of relevant items to users. These systems have received increasing attention from both academy and industry since the 90's, due to a variety of practical applications as well as complex problems to solve. Since then, the number of research papers published has increased significantly in many application domains (books, documents, images, movies, music, shopping, TV programs, and others). One of these domains has our attention in this paper due to the massive proliferation of televisions (TVs) with computational and network capabilities and due to the large amount of TV content and TV-related content available on the Web. With the evolution of TVs and RSs, the diversity of recommender systems for TV has increased substantially. In this direction, it is worth mentioning that we consider "recommender systems for TV" as those that make recommendations of both TV-content and any content related to TV. Due to this diversity, more investigation is necessary because research on recommender systems for TV domain is still broader and less mature than in other research areas. Thus, this literature review (LR) seeks to classify, synthesize, and present studies according to different perspectives of RSs in the television domain. For that, we initially identified, from the scientific literature, 282 relevant papers published from 2003 to May, 2015. The papers were then categorized and discussed according to different research and development perspectives: recommended item types, approaches, algorithms, architectural models, output devices, user profiling and evaluation. The obtained results can be useful to reveal trends and opportunities for both researchers and practitioners in the area.

Keywords: Literature review; Recommender systems; TV-content; TV-related content

1. Introduction

Recommender Systems (RSs) are software tools and techniques providing suggestions of relevant items to users (Burke, 2002). The suggestions relate to various decision-making processes, such as what products to buy, what music to listen to, or what TV programs to watch. Therefore, recommender systems can help people to identify contents of their interest among a large set of options available. These systems became an important research area since the publication of landmark papers in the 90s, when the term "collaborative filtering" was coined (Resnick and Varian, 1997). Since then, the number of research papers published has increased significantly in many application fields (books, documents, images, movies, music, shopping, TV programs, and others) (Park et al., 2012), as well as the amount of commercial applications of recommender systems by large companies such as *Amazon.com* (Linden et al., 2003), *Google* (Das et al., 2007), *Last.fm* (Eyke, 2009), *Netflix* (Bennett and Lanning, 2007), among others.

Nowadays, people have faced increasingly the content overload problem in several domains, especially after the Internet growth, which has become a challenge for both users and researchers. The huge amount of items (books, web pages, music, movies, etc.) available on the Internet has forced users to make hard choices in a myriad of alternatives that fits their needs. In this sense, users have appealed to their own experience, to recommendation of friends or even to specialized magazines/sites in order to make easier the process of selecting an item to consume. Although these alternatives have made this task easier, they are not able to learn the user's preferences and give more precise recommendations in an automatic way as RSs do (Adomavicius and Tuzhilin, 2005). However, despite all the RSs advances, they still require further improvements to make recommendation methods more effective and applicable to an even broader range of real-life applications, since new fields arise constantly (Ricci et al., 2011).

One of these domains (Television) has our attention in this paper due to the massive proliferation of TV sets with computational and network capabilities (Shin et al., 2013)(Kompatsiaris et al., 2012), as well as the large amount of TV contents (movies, documentaries, news, among others) available. Despite the TV has been improved recently, research about recommender systems in this domain has been studied earlier, in mid of 90s, with the first RS known for making movie recommendations, called Bellcore Video Recommender system (Hill et al., 1995). Recommender systems for television help TV viewers to find interesting TV contents to watch in an easier